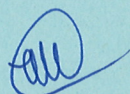


**STATE OF NEW HAMPSHIRE
INTER-DEPARTMENT COMMUNICATION**

FROM:



Matt Urban
Wetlands Program Specialist

DATE:

September 15, 2014

AT (OFFICE):

Department of
Transportation

SUBJECT

Dredge & Fill Application
Unity, 2014-M215-20

Bureau of
Environment

TO

Gino Infascelli, Public Works Permitting Officer
New Hampshire Wetlands Bureau
29 Hazen Drive, P.O. Box 95
Concord, NH 03302-0095

Forwarded herewith is the application package prepared by NH DOT Highway Maintenance District 2 for the subject Major impact project. This project is classified as Major per Env-Wt 904.09. The project is located on the 2nd NH Turnpike in the Town of Unity, NH. The proposed work consists of replacing twin 48" pipes with a 12'x5' 4-sided box culvert including concrete headwalls.

This project has not been to a natural resource agency meeting.

Mitigation is not anticipated for this project at this time.

The lead people to contact for this project are Douglas King, Assistant District Engineer, District 2 (448-2655 or dking@dot.state.nh.us) or Matt Urban, Wetlands Program Specialist, Bureau of Environment (271-3226 or murban@dot.state.nh.us).

A payment voucher has been processed for this application (Voucher #340304) in the amount of \$200.

If and when this application meets with the approval of the Bureau, please send the permit directly to Matt Urban, Wetlands Program Specialist, Bureau of Environment.

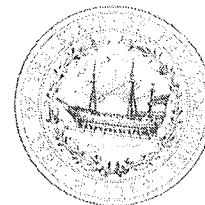
MRU: mru
Enclosures

cc:
BOE, Original
Town of Unity, (4 copies via certified mail)
Carol Henderson, NH Fish & Game
Edna Feighner, NH Division of Historic Resources
Maria Tur, US Fish & Wildlife
Mark Kern, US Environmental Protection Agency
Rich Roach, US Army Corp of Engineers



THE STATE OF NEW HAMPSHIRE
DEPARTMENT OF ENVIRONMENTAL SERVICES
LAND RESOURCES MANAGEMENT
WETLANDS BUREAU

29 Hazen Drive, PO Box 95, Concord, NH 03302-0095
Phone: (603) 271-2147 Fax: (603) 271-6588
<http://des.nh.gov/organization/divisions/water/wetlands>



PERMIT APPLICATION

Administrative Use Only	Administrative Use Only	Administrative Use Only	File No.
			Check No.
			Amount
			Initials

1. REVIEW TIME:

Indicate your Review Time below. Refer to Guidance Document A for instructions.

☒ Standard Review (Minimum, Minor or Major Impact)

☐ Expedited Review (Minimum Impact)

2. PROJECT LOCATION:

Separate applications must be filed with each municipality that jurisdictional impacts will occur in.

ADDRESS: **Approx. 2,900' south of Potato Hill Road**

TOWN/CITY: **Unity**

TAX MAP: **N/A**

BLOCK: **N/A**

LOT: **N/A**

UNIT: **N/A**

USGS TOPO MAP WATERBODY NAME: **Unnamed Brook**

☐ NA

STREAM WATERSHED SIZE: **1.33 sq mi**

☐ NA

LOCATION COORDINATES (If known): **43.2871°N /72.2497°W**

UTM ☐ State Plane

☒ Latitude/Longitude ☐

3. PROJECT DESCRIPTION:

Provide a brief description of the project outlining the scope of work. Attach additional sheets as needed to provide a detailed explanation of your project. DO NOT reply "See Attached" in the space provided below.

Replace twin 52'ft x 48" cmps with 52-ft 12'x5' 4-sided box culvert with new concrete headwalls.

4. RELATED PERMITS, ENFORCEMENT, EMERGENCY AUTHORIZATION, SHORELAND, ALTERATION OF TERRAIN, ETC...

None

5. NATURAL HERITAGE BUREAU & DESIGNATED RIVERS:

See the Instructions & Required Attachments document for instructions to complete a & b below.

a. Natural Heritage Bureau File ID: NHB **14 - 2335**

b. ☐ Designated River the project is in ¼ miles of: _____; and
date a copy of the application was sent to Local River Advisory Committee: Month: ____ Day: ____ Year: ____

☒ NA

6. APPLICANT INFORMATION (Desired permit holder)LAST NAME, FIRST NAME, M.I.: **King, Douglas R., P.E.**TRUST / COMPANY NAME: **NHDOT District 2**MAILING ADDRESS: **8 Eastman Hill Road**TOWN/CITY: **Enfield**STATE: **NH**ZIP CODE: **03748**EMAIL or FAX: **dking@dot.state.nh.us**PHONE: **(606) 448-2654**ELECTRONIC COMMUNICATION: By initialing here: DKR, I hereby authorize DES to communicate all matters relative to this application electronically**7. PROPERTY OWNER INFORMATION (If different than applicant)**

LAST NAME, FIRST NAME, M.I.:

TRUST / COMPANY NAME: **NH Department of Transportation**MAILING ADDRESS: **7 Hazen Drive, P.O. Box 483**TOWN/CITY: **Concord**STATE: **NH**ZIP CODE: **03302**

EMAIL or FAX:

PHONE: **(603) 271-7199**ELECTRONIC COMMUNICATION: By initialing here: DKR, I hereby authorize DES to communicate all matters relative to this application electronically**8. AUTHORIZED AGENT INFORMATION**LAST NAME, FIRST NAME, M.I.: **King, Douglas R. P.E.**COMPANY NAME: **NHDOT District 2**MAILING ADDRESS: **8 Eastman Hill Road**TOWN/CITY: **Enfield**STATE: **NH**ZIP CODE: **03748**EMAIL or FAX: **dking@dot.state.nh.us**PHONE: **(603) 448-2654**ELECTRONIC COMMUNICATION: By initialing here: DKR, I hereby authorize DES to communicate all matters relative to this application electronically**9. PROPERTY OWNER SIGNATURE:**

See the Instructions & Required Attachments document for clarification of the below statements

By signing the application, I am certifying that:

1. I authorize the applicant and/or agent indicated on this form to act in my behalf in the processing of this application, and to furnish upon request, supplemental information in support of this permit application.
2. I have reviewed and submitted information & attachments outlined in the Instructions and Required Attachment document.
3. All abutters have been identified in accordance with RSA 482-A:3, I and Env-Wt 100-900.
4. I have read and provided the required information outlined in Env-Wt 302.04 for the applicable project type.
5. I have read and understand Env-Wt 302.03 and have chosen the least impacting alternative.
6. Any structure that I am proposing to repair/replace was either previously permitted by the Wetlands Bureau or would be considered grandfathered per Env-Wt 101.47.
7. I have submitted a copy of the application materials to the NH State Historic Preservation Officer.
8. I authorize DES and the municipal conservation commission to inspect the site of the proposed project.
9. I have reviewed the information being submitted and that to the best of my knowledge the information is true and accurate.
10. I understand that the willful submission of falsified or misrepresented information to the New Hampshire Department of Environmental Services is a criminal act, which may result in legal action.
11. I am aware that the work I am proposing may require additional state, local or federal permits which I am responsible for obtaining.
12. The mailing addresses I have provided are up to date and appropriate for receipt of DES correspondence. DES will not forward returned mail



Property Owner Signature

Douglas R. King, P.E.

Print name legibly

Date


8/15/2014

MUNICIPAL SIGNATURES

10. CONSERVATION COMMISSION SIGNATURE

The signature below certifies that the municipal conservation commission has reviewed this application, and:

1. Waives its right to intervene per RSA 482-A:11;
2. Believes that the application and submitted plans accurately represent the proposed project; and
3. Has no objection to permitting the proposed work.


 Authorized Commission Signature	Print name legibly	Date
--	--------------------	------

DIRECTIONS FOR CONSERVATION COMMISSION

1. Expedited review ONLY requires that the conservation commission's signature is obtained in the space above.
2. The Conservation Commission signature should be obtained prior to the submittal of the original application and four copies to the town/city clerk for mailing to the DES.
3. The Conservation Commission may refuse to sign. If the Conservation Commission does not sign this statement for any reason, the application is not eligible for expedited review and the application will reviewed in the standard review time frame.

11. TOWN / CITY CLERK SIGNATURE

As required by Chapter 482-A:3 (amended 1991), I hereby certify that the applicant has filed five application forms, five detailed plans, and five USGS location maps with the town/city indicated below and I have received and retained certified postal receipts (or copies) for all abutters identified by the applicant.

 Town/City Clerk Signature	Print name legibly	Town/City	Date
--	--------------------	-----------	------

DIRECTIONS FOR TOWN/CITY CLERK:

Per RSA 482-A:3, I(d):

1. For applications where "Expedited Review" is checked on page 1, accept the application for mailing only if the Conservation Commission signature has been sought;
2. Collect the postal receipts demonstrating that all abutters and the Local Advisory Committee were sent proper notice;
3. Collect any administrative fees, not to exceed \$10 plus the cost of postage by certified mail (RSA 482-A:3, I).
4. IMMEDIATELY sign the original application and four copies in the signature space provided above;
5. Retain one copy of the application form, one complete set of attachments and the postal receipts demonstrating that all abutters and the Local River Advisory Committee were notified and make them reasonably accessible to the public;
6. IMMEDIATELY distribute a copy of the application with one complete set of attachments to each of the following bodies: the municipal Conservation Commission, the local governing body (Board of Selectmen or Town/City Council), and the Planning Board in accordance with RSA 482-A:3, I; and
7. IMMEDIATELY send the ORIGINAL application form, one complete set of attachments and filing fee, by CERTIFIED MAIL to the NHDES Wetlands Bureau at the address indicated on page 1 of this application. (DO NOT HOLD FOR CONSERVATION COMMISSION SIGNATURE).

12. IMPACT AREA:

For each jurisdictional area that will be/has been impacted, provide square feet and, if applicable, linear feet of impact

Permanent: impacts that will remain after the project is complete.

Temporary: impacts not intended to remain (and will be restored to pre-construction conditions) after the project is complete.

After-the-fact (ATF): work completed prior to receipt of this application by DES. Check box to indicate ATF.

JURISDICTIONAL AREA	PERMANENT Sq. Ft. / Lin. Ft.	TEMPORARY Sq. Ft. / Lin. Ft.
Forested wetland	<input type="checkbox"/> ATF	<input type="checkbox"/> ATF
Scrub-shrub wetland	<input type="checkbox"/> ATF	<input type="checkbox"/> ATF
Emergent wetland	<input type="checkbox"/> ATF	<input type="checkbox"/> ATF
Wet meadow	<input type="checkbox"/> ATF	<input type="checkbox"/> ATF
Intermittent stream	<input type="checkbox"/> ATF	<input type="checkbox"/> ATF
Perennial Stream / River	26 / 10 <input type="checkbox"/> ATF	255 / <input type="checkbox"/> ATF
Lake / Pond	/ <input type="checkbox"/> ATF	/ <input type="checkbox"/> ATF
Bank - Intermittent stream	/ <input type="checkbox"/> ATF	/ <input type="checkbox"/> ATF
Bank - Perennial stream / River	/ 10 <input type="checkbox"/> ATF	/ <input type="checkbox"/> ATF
Bank - Lake / Pond	/ <input type="checkbox"/> ATF	/ <input type="checkbox"/> ATF
Tidal water	/ <input type="checkbox"/> ATF	/ <input type="checkbox"/> ATF
Salt marsh	<input type="checkbox"/> ATF	<input type="checkbox"/> ATF
Sand dune	<input type="checkbox"/> ATF	<input type="checkbox"/> ATF
Prime wetland	<input type="checkbox"/> ATF	<input type="checkbox"/> ATF
Prime wetland buffer	<input type="checkbox"/> ATF	<input type="checkbox"/> ATF
Undeveloped Tidal Buffer Zone (TBZ)	<input type="checkbox"/> ATF	<input type="checkbox"/> ATF
Previously-developed upland in TBZ	<input type="checkbox"/> ATF	<input type="checkbox"/> ATF
Docking - Lake / Pond	<input type="checkbox"/> ATF	<input type="checkbox"/> ATF
Docking - River	<input type="checkbox"/> ATF	<input type="checkbox"/> ATF
Docking - Tidal Water	<input type="checkbox"/> ATF	<input type="checkbox"/> ATF
TOTAL	26 / 20	255 /

13. APPLICATION FEE: See the Instructions & Required Attachments document for further instruction

☐ Minimum Impact Fee: Flat fee of \$ 200

☐ Minor or Major Impact Fee: Calculate using the below table below

Permanent and Temporary (non-docking) 281 sq. ft. X \$0.20 = \$ 56.20

Temporary (seasonal) docking structure: sq. ft. X \$1.00 = \$

Permanent docking structure: sq. ft. X \$2.00 = \$

Projects proposing shoreline structures (including docks) add \$200 = \$

Total = \$ 56.20

The Application Fee is the above calculated Total or \$200, whichever is greater = **\$ 200.00**

Unity, M215-20



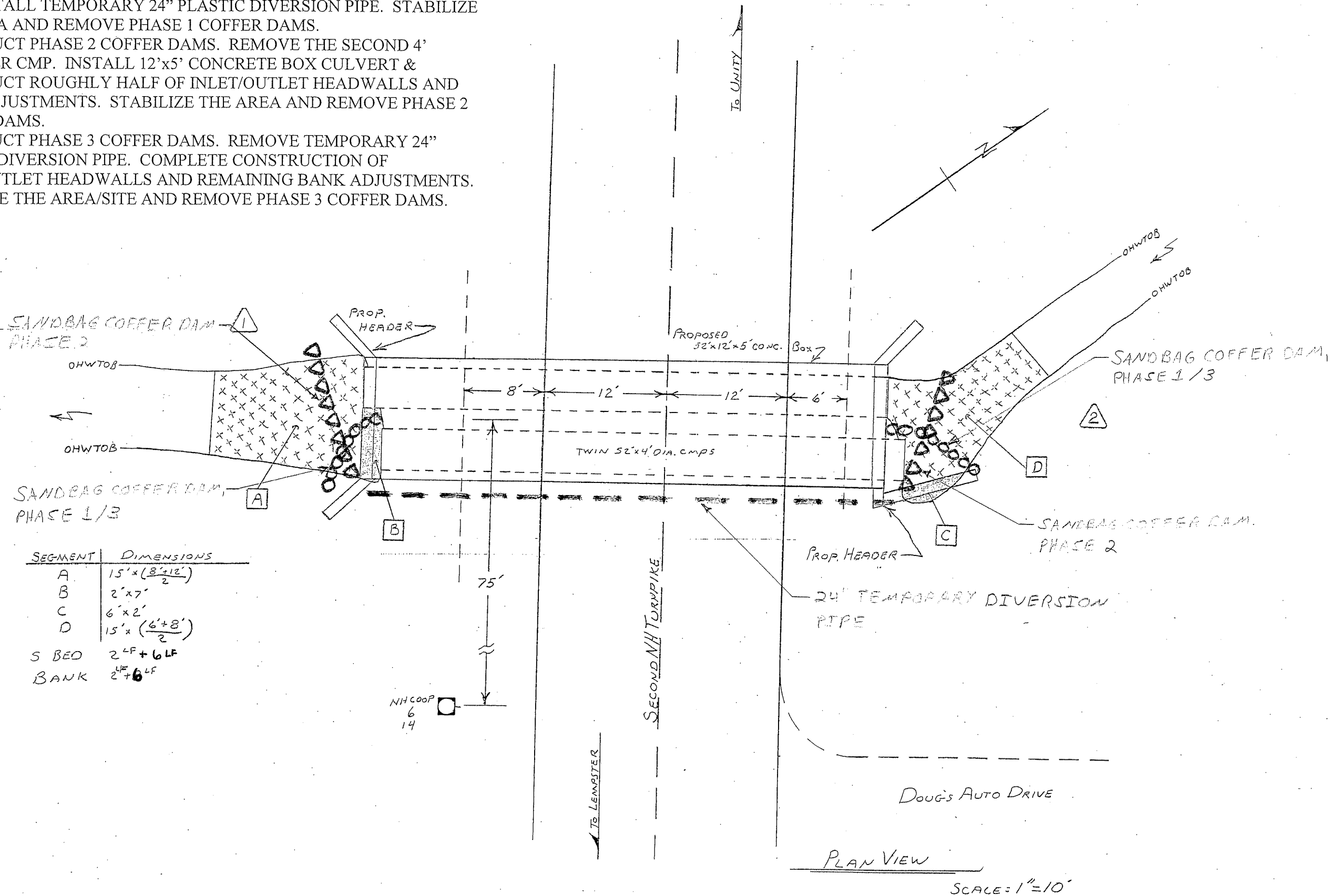
Copyright: © 2013 National Geographic Society, i-cubed

0 0.25 0.5 1 Miles

1:24,000

CONSTRUCTION SEQUENCE/
EROSION CONTROL PLAN

- SEQUENCE:
- 1.) CONSTRUCT PHASE 1 COFFER DAMS. REMOVE 1-4' DIAMETER CMP AND INSTALL TEMPORARY 24" PLASTIC DIVERSION PIPE. STABILIZE THE AREA AND REMOVE PHASE 1 COFFER DAMS.
 - 2.) CONSTRUCT PHASE 2 COFFER DAMS. REMOVE THE SECOND 4' DIAMETER CMP. INSTALL 12'x5' CONCRETE BOX CULVERT & CONSTRUCT ROUGHLY HALF OF INLET/OUTLET HEADWALLS AND BANK ADJUSTMENTS. STABILIZE THE AREA AND REMOVE PHASE 2 COFFER DAMS.
 - 3.) CONSTRUCT PHASE 3 COFFER DAMS. REMOVE TEMPORARY 24" PLASTIC DIVERSION PIPE. COMPLETE CONSTRUCTION OF INLET/OUTLET HEADWALLS AND REMAINING BANK ADJUSTMENTS. STABILIZE THE AREA/SITE AND REMOVE PHASE 3 COFFER DAMS.



UNITY
SECOND NH TURNPIKE
M215-20
11/26/2012
BY: DRC

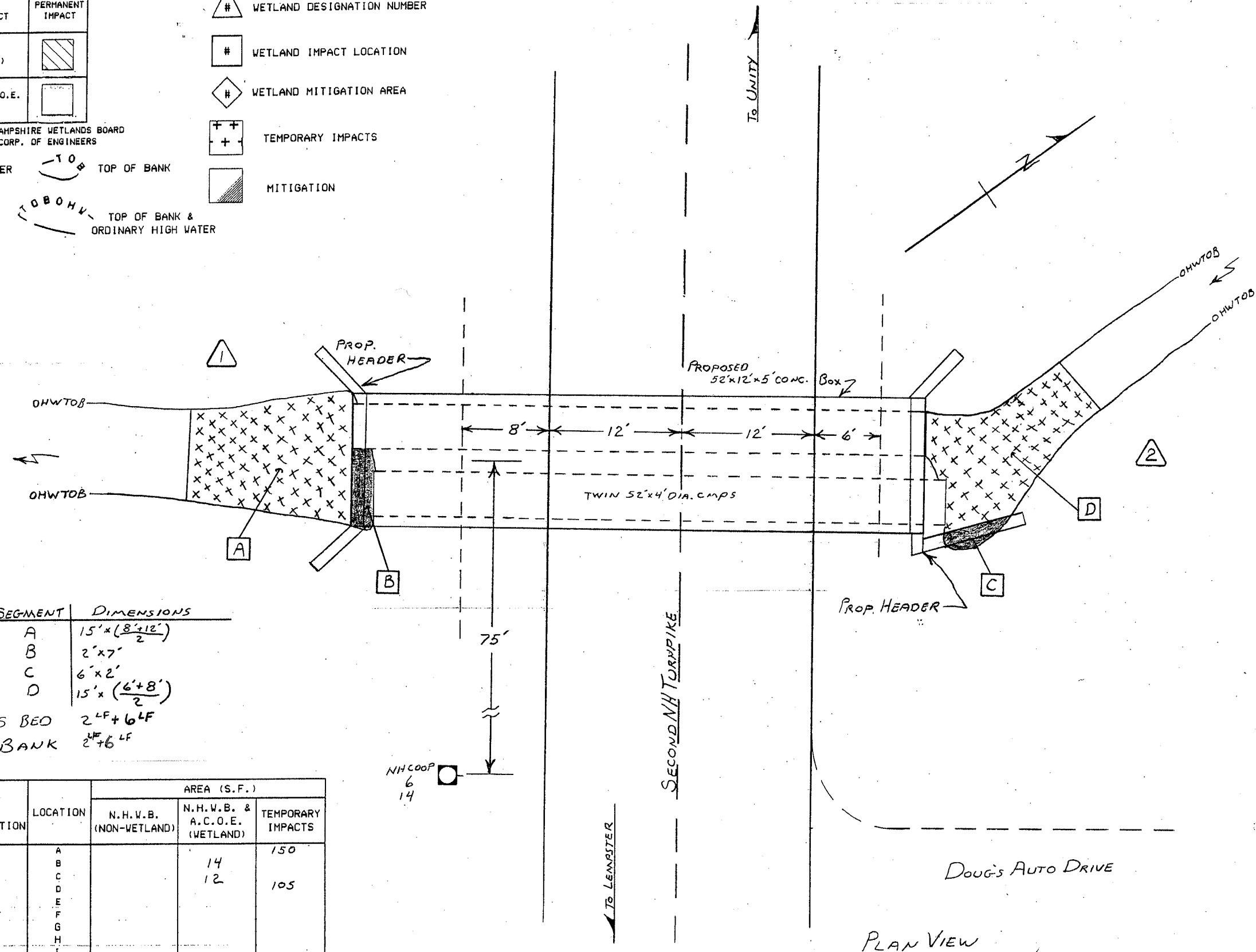
LEGEND

TYPE OF WETLAND IMPACT	PERMANENT IMPACT
N.H.W.B. (NON-WETLAND)	
N.H.W.B. & A.C.O.E. (WETLAND)	

N.H.W.B. - NEW HAMPSHIRE WETLANDS BOARD
A.C.O.E. - ARMY CORP. OF ENGINEERS

- WETLAND DESIGNATION NUMBER
- WETLAND IMPACT LOCATION
- WETLAND MITIGATION AREA
- TEMPORARY IMPACTS
- MITIGATION

- ORDINARY HIGH WATER
- TOP OF BANK
- TIDAL BUFFER ZONE
- TOP OF BANK & ORDINARY HIGH WATER



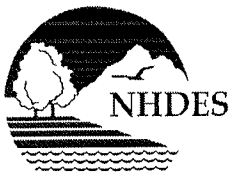
SEGMENT	DIMENSIONS
A	15' x $\frac{8'+12'}{2}$
B	2' x 7'
C	6' x 2'
D	15' x $\frac{6'+8'}{2}$
S BED	2' LF + 6' LF
BANK	2' LF + 6' LF

WETLAND DESIGNATION	USFWS WETLAND CLASSIFICATION	LOCATION	AREA (S.F.)		
			N.H.W.B. (NON-WETLAND)	N.H.W.B. & A.C.O.E. (WETLAND)	TEMPORARY IMPACTS
1	R3SB3	A			150
2	R3SB3	B		14	
		C		12	105
		D			
		E			
		F			
		G			
		H			
		I			

PERMANENT IMPACTS: 26 S.F.
TEMPORARY IMPACTS: 255 S.F.

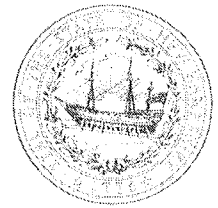
TOTAL IMPACTS: 281 S.F.

UNITY
SECOND NH TURNPIKE
M 215-20
11/26/2012
BY: JDR



THE STATE OF NEW HAMPSHIRE
DEPARTMENT OF ENVIRONMENTAL SERVICES
LAND RESOURCES MANAGEMENT
WETLANDS BUREAU

29 Hazen Drive, PO Box 95, Concord, NH 03302-0095
Phone: (603) 271-2147 Fax: (603) 271-6588
<http://des.nh.gov/organization/divisions/water/wetlands/index.htm>
Permit Application Status: <http://des.nh.gov/onestop/index.htm>



PERMIT APPLICATION - ATTACHMENT A MINOR & MAJOR 20 QUESTIONS

Env-Wt 302.04 Requirements for Application Evaluation - For any major or minor project, the applicant shall demonstrate by plan and example that the following factors have been considered in the project's design in assessing the impact of the proposed project to areas and environments under the department's jurisdiction. Respond with statements demonstrating:

1. The need for the proposed impact.

This project is needed because the twin culvert pipes are in poor condition. The southbound lane of the Second NH Turnpike has started to settle.

2. That the alternative proposed by the applicant is the one with the least impact to wetlands or surface waters on site.

This project has the least impact because it increases the clear opening and improves the passage of aquatic life by utilizing an embedded box culvert. Replacing in kind left small openings. The do nothing option threatened the integrity of the roadway.

3. The type and classification of the wetlands involved.

Riverine Upper Perennial, Cobble Gravel Streambed (R3SB3)

4. The relationship of the proposed wetlands to be impacted relative to nearby wetlands and surface waters.

The proposed wetlands to be impacted are similar to nearby wetlands and surface waters.

5. The rarity of the wetland, surface water, sand dunes, or tidal buffer zone area.

The wetlands in the project area are not considered rare.

6. The surface area of the wetlands that will be impacted.

255 sq. ft. - temporary

26 sq. ft. - permanent

7. The impact on plants, fish and wildlife including, but not limited to:

- a. Rare, special concern species;
- b. State and federally listed threatened and endangered species;
- c. Species at the extremities of their ranges;
- d. Migratory fish and wildlife;
- e. Exemplary natural communities identified by the DRED-NHB; and
- f. Vernal pools.

- No rare, special concern, or threatened and endangered species were identified.

- The culvert replacement will be wider than the existing twin pipes providing more area for migratory fish and wildlife species. It will also be embedded to simulate a natural stream bottom.

- There were no exemplary natural communities identified.

- There are no vernal pools located in the work area.

8. The impact of the proposed project on public commerce, navigation and recreation.

There will be no impact on public commerce, navigation and recreation in the unnamed brook.

9. The extent to which a project interferes with the aesthetic interests of the general public. For example, where an applicant proposes the construction of a retaining wall on the bank of a lake, the applicant shall be required to indicate the type of material to be used and the effect of the construction of the wall on the view of other users of the lake.

There will be no negative impact to the aesthetic interests of the general public.

10. The extent to which a project interferes with or obstructs public rights of passage or access. For example, where the applicant proposes to construct a dock in a narrow channel, the applicant shall be required to document the extent to which the dock would block or interfere with the passage through this area.

There will be no interference or obstruction to the public rights of passage.

11. The impact upon abutting owners pursuant to RSA 482-A:11, II. For example, if an applicant is proposing to rip-rap a stream, the applicant shall be required to document the effect of such work on upstream and downstream abutting properties.

There will no negative impact on abutting owners.

12. The benefit of a project to the health, safety, and well being of the general public.

The public will benefit by continuing to have safe passage over the unnamed brook.

13. The impact of a proposed project on quantity or quality of surface and ground water. For example, where an applicant proposes to fill wetlands the applicant shall be required to document the impact of the proposed fill on the amount of drainage entering the site versus the amount of drainage exiting the site and the difference in the quality of water entering and exiting the site.

There will be no impact on quantity or quality of surface or ground water.

14. The potential of a proposed project to cause or increase flooding, erosion, or sedimentation.

There will be no increase in flooding, erosion, or sedimentation.

15. The extent to which a project that is located in surface waters reflects or redirects current or wave energy which might cause damage or hazards.

The culvert replacement will be in the same alignment with the existing twin pipes which currently does not reflect or redirect water.

16. The cumulative impact that would result if all parties owning or abutting a portion of the affected wetland or wetland complex were also permitted alterations to the wetland proportional to the extent of their property rights. For example, an applicant who owns only a portion of a wetland shall document the applicant's percentage of ownership of that wetland and the percentage of that ownership that would be impacted.

There would be no cumulative impact if all parties owning/abutting parties of the affected wetland.

17. The impact of the proposed project on the values and functions of the total wetland or wetland complex.

There will no negative impact of the project on the values and functions of the total wetland complex.

18. The impact upon the value of the sites included in the latest published edition of the National Register of Natural Landmarks, or sites eligible for such publication.

There are no known sites in the project area that are identified in the latest published edition of the National Register of Natural Landmarks, or sites eligible for such publication.

19. The impact upon the value of areas named in acts of congress or presidential proclamations as national rivers, national wilderness areas, national lakeshores, and such areas as may be established under federal, state, or municipal laws for similar and related purposes such as estuarine and marine sanctuaries.

There are no such areas identified in the project area.

20. The degree to which a project redirects water from one watershed to another.

The project will not redirect water from one watershed to another.

Additional comments

Bureau of Environment

Stream Crossing Assessment Report

Project: Unity 2013-M215-20

Tier: 3

Assessment completed by: BOE

Date assessment completed: 7/11/2013

Rosgen Stream Classification at Crossing: E
Rosgen Stream Classification at Reference: B

Watershed Size (acres): 851 acres
Average Bankfull Width at Crossing: 10'
Average Bankfull Width at Reference Reach: 11.33'

Environmental consideration resulting in Tier 3 classification? ☐ Yes ☒ No

If yes, what is the consideration?

Can it be mitigated down to watershed-based tier? ☐ Yes ☐ No

If yes, how? N/A

Special considerations based on Rosgen Stream Type (from the NH Stream Crossing Guidelines):

The initial Rosgen classification was determined to be a Type E stream due to the characteristics found in the field. It was apparent that twin pipe structure influenced the stream. Further investigations upstream determined that the Rosgen Classification was a Type B stream. In the reference reach the average bankfull width was approximately 11 feet and therefore we traveled approximately 7 to 10 times that length collecting reference data.

The following considerations are for each stream type:

Type E

Type E channels are relatively stable, sinuous channels with very wide flood plains. The stream banks and flood plains are usually well vegetated, often with wetland plant species. Entrenchment ratios can be as high as 100 in broad, unconfined valleys. This high entrenchment ratio is difficult to accommodate with a single stream crossing structure. The least impacting approach to crossing an E type stream would be a bridge or piered structure that spans the flood-prone area. However, the costs associated with this approach may be prohibitive, and thus it is recommended that crossings not be located on Type E channels.

Two important considerations when designing a crossing of an E type stream are preserving the width/depth ratio of the stream channel and maintaining access to flood plains. Type E channels are stable, but vulnerable to disturbance, and can rapidly change into different channel types if stream channel dimensions are altered. It is highly recommended that crossings of Type E channels be at a minimum width of 1.2 times bankfull width plus 2 feet and that flood plain culverts at bankfull elevation be used to avoid constricting flood flows through the main channel. If the stream channel must be rebuilt within a structure, it is important to maintain the natural width/depth ratio to avoid destabilizing the stream.

Type B

Type B streams display moderate sinuosity, slope, width/depth ratios, and entrenchment. This generally stable stream type commonly consists of riffles and rapids and occasional scour pools. Type B streams are often

found in forested areas with flood plain vegetation moderately influencing channel stability. Streambank erosion is typically considered low and sensitivity to disturbance is often low to moderate. Fish habitat in this channel type is often attributed to scour pools developed by large woody material.

Stream crossings commonly occur over B and C type channels in New Hampshire because they tend to occur in valleys that are conducive to road building and development. From a stream crossing perspective, B type streams are a transition in design issues between A and C type streams. Approaches to crossing a B type stream vary with the size of the flood plain. At one end of the spectrum are B type streams with lower entrenchment ratios (1.4). The relatively narrow flood-prone area may be accommodated with a single opening. At the other end of the spectrum are the B type streams with entrenchment ratios of up to 2.1. These streams behave more like C type streams, with lower slopes and wider flood plains. The flood-prone area in relation to the bankfull width may be too wide for a single opening and should be either spanned or accommodated with flood plain drainage structures. In either case, an analysis of bedload capacity will ensure that the structure design will not impact sediment transport capacity through the stream reach.

The design elements checked below are required by the NHDES Stream Crossing Rules for the subject stream crossing. If the project cannot incorporate these design elements, the permit application must include a Technical Report for an alternative design pursuant to Env-Wt 904.09. Please contact the Bureau of Environment for further guidance.

Required design elements:

- ☒ Structure size: 1.2X Bankfull Width + 2' = 16'
- ☒ Span-structure or 3-sided culvert (not a closed structure)
- ☐ Embedded culvert or pipe arch
- ☒ Simulation of a natural stream channel through the structure (This would be based in part on the attached longitudinal profile, average bankfull dimensions of the reference reach, and existing substrate.)
- ☒ Bed forms and streambed characteristics necessary to maintain comparable water depths and velocities through the structure as occur upstream and downstream.
- ☒ Vegetated bank on both sides of the watercourse
- ☒ Accommodate 100-year flood and sediment transport
- ☒ Preservation of natural alignment and gradient of stream channel.

Notes: A 16' span structure or 3-sided culvert with channel simulation through the structure is the recommended based on the stream crossing guidelines. If this is not practicable as defined in Env-Wt 101.69 you can apply for a permit under the alternative design rules. You may begin to prepare an application for a structure of this size or contact the Bureau of Environment to move forward with an alternative design.



New Hampshire StreamStats

Basin Characteristics Report

Date: Fri Jan 25 2013 11:23:17 Mountain Standard Time

NAD27 Latitude: 43.2870 (43 17 13)

NAD27 Longitude: -72.2500 (-72 14 60)

NAD83 Latitude: 43.2870 (43 17 13)

NAD83 Longitude: -72.2495 (-72 14 58)

Parameter	Value
Area in square miles	1.33
Mean annual precipitation in the Conn River basin, in inches	46.186
10-85 slope in feet per mile based on preprocessed data	178
Coarse-grained stratified drift - SYE	0
X coordinate of the outlet in New Hampshire State Plane (feet)	829065.0
Y coordinate of the outlet in New Hampshire State Plane (feet)	287385.0
X coordinate of the centroid in New Hampshire State Plane (feet)	831256.5
Y coordinate of the centroid in New Hampshire State Plane (feet)	291364.6
Mean Basin Slope from 30 m DEM	8.639
Maximum Basin Elevation in feet	1871.608
Percent Coniferous Forest	25.0700
Jan to Mar Basin Centroid Precipitation	7.32
Mean Annual Temperature	44.600
June to October Mean Basinwide Temperature	60.836
June to Oct Gage Precip in inches	18.7
Percent Mixed Forest	22.6025
March to May Gage Precip in inches	9.1

851.2^{AC}

1 sq mi = 640^{AC}

**NH Department of Transportation
Bureau of Highway Maintenance
Project, #M215-20
Env-Wt 904.09 Alternative Design
TECHNICAL REPORT**

Env-Wt 904.09(a) - If the applicant believes that installing the structure specified in the applicable rule is not practicable, the applicant may propose an alternative design in accordance with this section.

Please explain why the structure specified in the applicable rule is not practicable (Env-Wt 101.69 defines practicable as *available and capable of being done after taking into consideration costs, existing technology, and logistics in light of overall project purposes.*)

As a Tier 3 crossing, the recommended crossing is calculated to be a 16' wide span or open bottomed, 3-sided box.. Due to cost, we are proposing an alternative design of a 12' wide, 5' tall, 4-sided box culvert. For material only, a 16' wide, 3-sided box culvert will cost approximately \$84,000, while a 12' wide, 4-sided box culvert will cost \$60,000. Excavation and engineering costs are also greater for the 3-sided option due to footings.

The proposed alternative meets the specific design criteria for Tier 2 and Tier 3 crossings to the maximum extent practicable, as specified below.

Env-Wt 904.05 Design Criteria for Tier 2 and Tier 3 Stream Crossings – New Tier 2 stream crossings, replacement Tier 2 crossings that do not meet the requirements of Env-Wt 904.07, and new and replacement Tier 3 crossings shall be designed and constructed:

(a) In accordance with the NH Stream Crossing Guidelines.

The alternative design will be in accordance with the NH Stream Crossing Guidelines.

(b) With bed forms and streambed characteristics necessary to cause water depths and velocities within the crossing structure at a variety of flows to be comparable to those found in the natural channel upstream and downstream of the stream crossing.

The alternative design will be embedded to provide 1-foot of substrate through the structure that is comparable to the natural stream channel.

(c) To provide a vegetated bank on both sides of the watercourse to allow for wildlife passage.

The existing riparian area up and downstream of the structure will remain vegetated.

(d) To preserve the natural alignment and gradient of the stream channel, so as to accommodate natural flow regimes and the functioning of the natural floodplain.

The natural alignment and gradient of the stream channel will be preserved.

(e) To accommodate the 100-year frequency flood, to ensure that (1) there is no increase in flood stages on abutting properties; and (2) flow and sediment transport characteristics will not be affected in a manner which could adversely affect channel stability.

The proposed design is not expected to alter flooding and/or sediment transport.

(f) To simulate a natural stream channel.

With the proposed structure embedded one foot and an increase in width from two 4-foot culverts to a single 12-foot box culvert, the natural stream channel will be simulated as much as possible.

(g) So as not to alter sediment transport competence.

The proposed design is not expected to change sediment transport competence.

Env-Wt 904.09(c)(3) – The alternative design must meet the general design criteria specified in Env-Wt 904.01:

Env-Wt 904.01

(a) Not be a barrier to sediment transport;

The proposed alternative design is wider than the existing twin pipes and is a continuous opening. It will not be a barrier to sediment transport.

(b) Prevent the restriction of high flows and maintain existing low flows;

With a wider continuous opening, the alternative design will not restrict high flows and will maintain low flows.

(c) Not obstruct or otherwise substantially disrupt the movement of aquatic life indigenous to the waterbody beyond the actual duration of construction;

With the box culvert embedded in the stream, aquatic life movement will not be obstructed.

(d) Not cause an increase in the frequency of flooding or overtopping of banks;

Frequency of flooding or overtopping of banks will not be increased due to the alternative design.

(e) Preserve watercourse connectivity where it currently exists;

Watercourse connectivity will be preserved.

(f) Restore watercourse connectivity where: (1) Connectivity previously was disrupted as a result of human activity(ies); and (2) Restoration of connectivity will benefit aquatic life upstream or downstream of the crossing, or both;

The alternative design will continue to provide watercourse connectivity under the Second NH turnpike and provide a better path for aquatic life.

(g) Not cause erosion, aggradation, or scouring upstream or downstream of the crossing; and

The box culvert will be embedded so erosion and aggradation will not be a factor. Scouring will not be a factor either.

(h) Not cause water quality degradation.

Water quality will not be degraded.

*****Note: An alternative design for Tier 1 stream crossings must meet the general design criteria (Env-Wt 904.01) only to the *maximum extent practicable*.**



New Hampshire Natural Heritage Bureau

To: Chris Turgeon
8 Eastman Hill Road
Enfield, NH 03748

Date: 6/25/2014

From: NH Natural Heritage Bureau

Re: Review by NH Natural Heritage Bureau of request dated 6/25/2014
NHB File ID: NHB14-2335

Applicant: Chris Turgeon

Location: Tax Map(s)/Lot(s):
Unity

Project Description: Replace existing twin 4' diameter culverts with a precast concrete box culvert.

The NH Natural Heritage database has been checked for records of rare species and exemplary natural communities near the area mapped below. The species considered include those listed as Threatened or Endangered by either the state of New Hampshire or the federal government. We currently have no recorded occurrences for sensitive species near this project area.

A negative result (no record in our database) does not mean that a sensitive species is not present. Our data can only tell you of known occurrences, based on information gathered by qualified biologists and reported to our office. However, many areas have never been surveyed, or have only been surveyed for certain species. An on-site survey would provide better information on what species and communities are indeed present.

This report is valid through 6/24/2015.



MAP OF PROJECT BOUNDARIES FOR NHB FILE ID: NHB14-2335

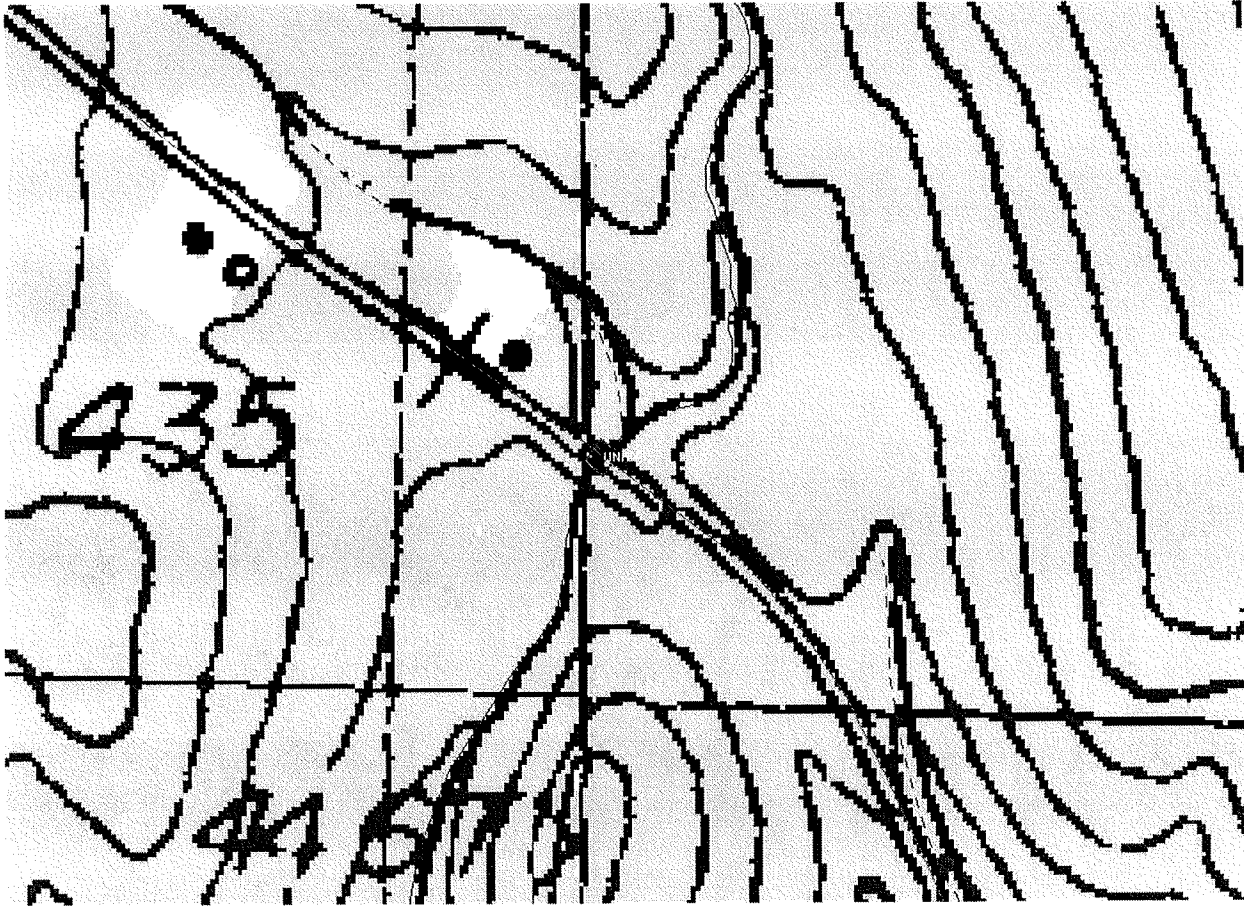




Figure 1: Looking toward Unity.



Figure 2: Looking toward Lempster.



Figure 3: Upstream.



Figure 4: Inlet.



Figure 5: Outlet.



Figure 6: Downstream.